

The Impact of Non-Tidal Oceanic Processes on Geodesy

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The oceans have a major impact on global geophysical processes of the Earth. Non-tidal changes in oceanic currents and ocean-bottom pressure have been shown to be a major source of polar motion excitation and also measurably change the length of the day. Changes in the mass distribution of the oceans cause the Earth's gravitational field to change, an effect which will soon be accurately measured by the CHAMP and GRACE satellite missions. As the mass distribution of the oceans change, the center-of-mass of the oceans will change which in turn causes the center-of-mass of the solid Earth, or geocenter, to change. The changing mass distribution of the oceans also changes the load on the oceanic crust, thereby affecting both the vertical and horizontal position of observing stations located near the oceans. Recognizing the important role that non-tidal oceanic processes play in Earth rotation dynamics and terrestrial reference frame definition, the International Earth Rotation Service (IERS) has recently created a Special Bureau for the Oceans in order to facilitate research into these and other solid Earth geophysical processes affected by the oceans.